System Development Life Cycle (SDLC) Process Guide

2/09/01

Table of Contents

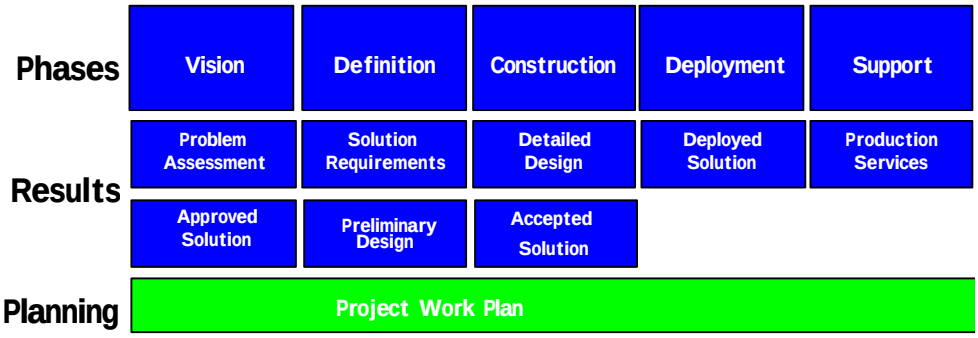
1. INTRODUCTION

This Guide documents the Department of Education's Student Financial Assistance (SFA) System Development Life Cycle (SDLC) Process. The SDLC within SFA will be known and referred to as the Solution Life Cycle (SLC). It is intended to provide a baseline approach to system development and solutions for the acquisition process across the SFA organization.

As a baseline approach, this SLC Process will become an integral part of SFA business processes in order for it to be accepted, utilized and maintained within the organization. No system development process can remain stationary in today's world of rapid technology and organizational change. This document and the overall process will continue to evolve through an "evergreening" process in order to remain as current and relevant as possible. It is SFA's intent to further develop the processes identified within this Guide as part of a continuous SFA process improvement program.

The SLC Process brings together a variety of standard procedures, best practices, tools and reusable components to empower SFA personnel and contractors to achieve successful solutions that are on time and on budget. These standard procedures may be modified as required to meet objectives specific to the most effective type of development and implementation (Custom Development, Commercial off the Shelf (COTS), Application Service Provider (ASP), Rapid Application Development (RAD), Object-Oriented Development (OOD), etc.). Through the use of a standardized process, Integrated Product Teams (IPT) and Project Managers will know what is expected of them and others. This will facilitate communication across the organization and will result in a more efficient and cost effective solution.

The SLC Process is composed of a sequence of five phases: vision, definition, construction, deployment and support. The phases are flexible so that some elements described within each phase may be skipped or abbreviated, should the situation require it. Regardless of what stage of development an IPT is in, they can begin utilizing the SLC Process immediately. Life cycle process steps have been combined together into standard phases. These phases have been defined to help manage the risk inherent in any system development project. They include commit points for decision-making and other forms of review. It is recognized that no project can accommodate all of the practices and processes described within this Guide due to individual types, elements of risk and other factors.



Each phase is guided by user and stakeholder input, and builds upon the product(s) of the previous phase, with continual consideration of the objectives stated in the Business Case. This Guide documents the following topics in distinct sections for each of the five phases:

- Objective;
- Entry Criteria;
- Process and Outputs;
- Roles and Responsibilities;
- Exit Criteria; and
- Job Aids.

This information will enable a project team to quickly look at the five phases within the Process Guide to assess what they need to accomplish, regardless of what stage of the life cycle a team is in.

Some projects may develop a solution in several iterations of vision, definition, and construction, and then integrate the iterations together. Other projects may develop and deploy separate iterations, gradually building functionality in use. In all cases, the deliverables of each phase should support the needs of the SFA Business Case for that initiative or project.

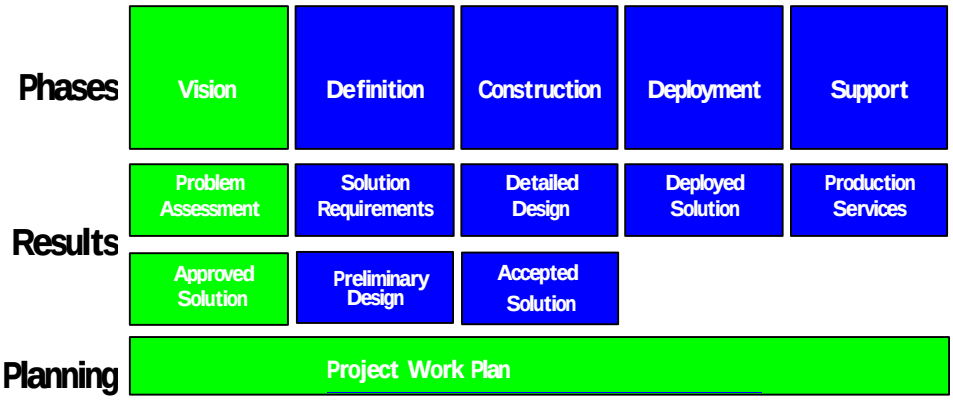
A few principles have guided the development of this process:

- Interaction with the end users and stakeholders is vital to the development of a successful solution;
- There is an inherent need for "standardized" or "core" project deliverables and formats within the SFA organization;
- The process described should be easy to understand and follow, but be flexible enough to allow for growth and change within the organization and its initiatives;
- The SDLC Process, as well as this Guide should "evergreen", and be continually maintained and kept current; and

- The end goal is meeting the business need. The SLC Process is aimed at keeping the documentation to an essential set.

This Guide is organized so that the necessary steps and activities associated with each phase of the life cycle can be easily identified. It is also designed so Project Managers and team members alike can understand the context of each activity within the entire SLC Process.

2. VISION PHASE



A summary of SLC recommendations for use during the Vision Phase is contained within the following matrix.

Phase Area	SLC Recommendations
OBJECTIVE	Understand the specific issue(s) facing SFA and conduct an assessment of the business problem or opportunity, so that a recommended solution can be articulated in a Business Case and the IPT can be formed to begin planning the solution.
ENTRY CRITERIA	• A business need has been identified that requires an assessment and solution recommendation; and • A member of the SFA Management team has been identified to guide and oversee the Vision Phase process and development of appropriate outputs.

Phase Area	SLC Recommendations
PROCESS AND OUTPUTS *** Sample is provided in Appendix A**	• Business Case; * • Statement of Objectives (SoO); * • Task Order; * • IPT Formation; • Project Work Plan *, including - Objective/Scope; - Budget; - Roles and Responsibilities; - Work Breakdown Structure (WBS); - Schedule; - Resources; - Risk Management Plan; - Quality Management Plan; - Communications Plan; - Configuration Management Plan; - Assumptions and Constraints; • Business Performance Model; * and • Project Status Reports.*
ROLES AND RESPONSIBILITIES	The following resources will participate in this phase: Investment Review Board (IRB) Decision Support Group (DSG) Executive Sponsor Executive Steering Committee IPT Chief Information Officer (CIO) E-Commerce Application Development (ECAD) CIO IT Services CIO IT Management IT Representative (ITR) Subject Matter Experts (SME) Systems Security Officer Systems Manager
EXIT CRITERIA	• The Business Case has been developed and approved by the IRB; • The SoO has been issued; • The Task Order has been awarded; • The IPT has been formed; • A Business Performance Model has been developed by the IPT and approved by the Executive Sponsor; • The Project Work Plan has been developed by the IPT and approved by the Executive Sponsor • SLC Security Vision Phase checklist completed and approved

Phase Area	SLC Recommendations
JOB AIDS **(Provided in Appendix B)**	Project Work Plan Checklist SLC Security Vision Phase Checklist Additional Security Job Aids listed in the SFA Security Process Manual

2.1 Vision Phase Objective

The objective of this phase is to understand the specific issue(s) facing SFA and (1) conduct an assessment of the business problem or opportunity; (2) articulate a recommended solution in a Business Case; and (3) form an IPT to begin planning a solution.

This is the phase in which solution planning will be performed, and the primary drivers for the remaining phases (i.e., business objectives, performance goals) will be defined.

The Vision Phase is the foundation of the SDLC Process, and the Business Case is the blueprint for the solution. Although the Business Case is created and approved in this initial phase of the life cycle, it is critical that the development of the solution in subsequent phases tie back to the Business Case. The requirements must meet the objectives stated in the Business Case, the design must meet the requirements, the development must meet the design, the testing must verify the design and validate the requirements, and the deployment must satisfy the objectives as outlined in the Business Case. The following topics will be addressed for the Vision Phase:

- Entry Criteria;
- Process and Outputs;
- Roles and Responsibilities;
- Exit Criteria; and
- Job Aids.

2.2 Vision Phase Entry Criteria

In this phase of the SDLC Process, the only entry criteria are that (1) an SFA business issue that is in need of an IT solution has been identified, and (2) a member of the SFA management team has been identified to guide and oversee the development of the solution. If these criteria have been met, the Vision Phase processes can be initiated.

2.3 Vision Phase Process and Outputs

The following paragraphs discuss the processes and outputs to be completed during the Vision Phase.

Business Case

The first task of this phase is to conduct a thorough analysis of the business issue needs and recommend a solution to satisfy those needs. This information will be developed by a member of SFA Management team and documented in the form of a Business Case. The Business Case is used during the IRB investment management process to obtain funding for the project, and will drive subsequent development, implementation and verification of the solution. *A sample Business Case is included for reference in Appendix A.* The Business Case should:

- Identify the root cause of the business need;
- Identify projected costs and benefits;
- Focus on the value of the solution being proposed;
- Clearly identify the scope of the business issue and solution;
- Identify high-level measures of performance; and
- Provide ultimate justification for the investment of SFA funds into the recommended solution.

Before the Business Case can be developed, a clear articulation of the business issue(s) must be documented so that a comprehensive recommendation can be determined. This process begins by gathering information from both internal and external sources. The sources should be selected based on their subject matter expertise and knowledge of the business issue that is to be developed in the Business Case. The information gathered for review includes the Modernization Blueprint, existing processes, technologies, resources, timeframes for implementation, SFA organizational structure, and communication methods. During this phase, security should be considered while the system's business case and requirements are developed. Once the research has been completed, the business needs and a detailed solution recommendation should be stated in the Business Case.

The completed Business Case should be submitted to the Decision Support Group (DSG) to enable the Investment Review Board (IRB) investment management process to be initiated. The DSG will review the Business Case and provide feedback for improvements. When satisfied with the Business Case, the DSG will submit it to the IRB for approval. Official agreement to proceed is confirmed through the approval of the Business Case by the IRB, which consists of the Chief Operating Officer (COO), Channel General Manager(s) (GM), the Chief Financial Officer (CFO) and the CIO. The agreement to proceed is provided to SFA Management and may include initial or full funding to develop the solution. In either case, if additional funding or reductions in funding are needed, the Business Case must be updated and resubmitted for approval.

Once approved, the Business Case must be maintained throughout the life cycle phases by the IPT responsible for development of the solution and provided to the IRB. The IRB is responsible for reviewing the investment as it progresses, requesting changes as appropriate, and evaluating the benefits realized after the solution has been delivered to determine if the objectives, costs and benefits outlined in the Business Case were achieved.

Statement of Objectives (SoO)

Once the Business Case has been approved by the IRB, the project team should develop the SoO. The SoO will serve as the basis for the work to be completed during the delivery of the solution, whether by SFA personnel or a team of SFA and contractor personnel. *A sample SoO is included for reference in Appendix A.* The SoO should clearly outline:

- The background of the business issue;
- Objectives of the recommended solution;
- High-level requirements necessary to meet the objectives;
- List of Government provided resources;
- Outputs or deliverables required to meet the objectives and satisfy the requirements; and
- Period of performance for the development and implementation of the recommended solution.

Task Order

Once the SoO has been developed, a Task Order may be created and awarded to a contractor team to assist SFA in developing and implementing the solution recommended in the Business Case. *A sample Task Order is included for reference in Appendix TBD. See the SFA System Security Process Guide for security specific requirements.* The Task Order should respond to the SoO in its content. Note that the Task Order is a contractual obligation between SFA and the contractor team and states the responsibilities of both SFA and the contractor during the delivery of the solution.

IPT Formation

Once the SoO is complete, an IPT should be formed that is led by the SFA Management team member responsible for the delivery of the solution. The IPT should contain other members of SFA and the contractor teams necessary for the development and delivery of the solution. The purpose of the IPT is to:

- Ensure that the SDLC Process is followed, and all activities are organized around *products* - and focus the team members on delivery of products, not just the tasks they are assigned;
- Engage the right competencies to develop each component (e.g., functional, technical, change management skills, etc.), taking advantage of each team members' skill sets in order to minimize risk;
- Facilitate team communication and understanding of the problem or opportunity and the solution; and
- Improve cooperation between team members from SFA and the contractor team, while still holding the contractor team responsible for the end products identified in the Task Order.

The IPT should be led by the Project Manager or the Systems Manager assigned responsibility in writing by the Executive Sponsor (Functional Manager) for the successful delivery of the solution. The system manager, in turn, should assign, again in writing, a system security officer. These two positions are usually Department of Education staff and are critical to the continual inclusion of security into the system. Early identification of these personnel will promote the addition of security into the system's development from the initial concept and throughout its development. Moreover, the certification and accreditation (C&A) requirement for each system stresses the appointment of key personnel to manage the C&A process. See the SFA System Security Process Guide for qualifications and samples of Assignment Letters.

The IPT should be comprised of other team members appropriate to this solution delivery. The composition of the team will vary depending upon the content and type of solution, but may include members of the Business Unit, CIO Ecommerce Application Development (eCAD), CIO Information Technology (IT) Management, CIO IT Services, others from SFA where appropriate and the contractor teams where appropriate. These members will occupy the various key roles and responsibilities for implementation of the SLC within the key process areas. Some of the positions are: Systems Security Manager, Systems Security Officer, Configuration Manger, Requirements Development Manager, SFA Planning Manager, SFA Transition to Support Lead, Subject Matter Experts and others. (See Roles and Responsibilities.) The IPT should report periodically to an Executive Steering Committee, consisting of the Executive Sponsor, and an executive from both the CIO and contractor. The Executive Steering Committee is responsible for reviews and recommendations made by the IPT throughout the delivery of the solution.

The formation of the IPT should be followed by a kick-off meeting with all the participants, in which the objectives, resources, schedule and major outputs are discussed. Other agenda items may include roles and responsibilities, risk management activities, review processes, etc.

Project Work Plan

The first output of the IPT should be the Project Work Plan. This documentation outlines the necessary tasks, level of effort, cost, and schedule for accomplishing the recommended solution. The Project Work Plan evolves over time throughout the life cycle of the solution delivery.

The purpose of the Project Work Plan is to describe how the IPT will conduct the project in order to achieve the desired solution. *A sample Project Work Plan is included for reference in Appendix A. A checklist to use as a guide in developing the plan is included for reference in Appendix B.* The Project Work Plan should include:

- **Objective/Scope** – Specifically identifies what is to be achieved with the delivery of the solution;
- **Budget** - Identifies how much the solution delivery is to cost SFA;
- **Roles and Responsibilities** – identifies the key personnel or organizations involved in each phase of the life cycle for this solution delivery, as well as their respective roles and responsibilities;

- **Work Breakdown Structure (WBS) -** Identifies the work to be performed, often in a hierarchical view of deliverables and/or tasks required to deliver the solution;
- **Schedule** – Often combined with the WBS, the schedule illustrates the required timeline of the solution delivery, by identifying start and end dates of each of the major tasks, as well as required completion and delivery dates of major outputs;
- **Resources** – Often combined with the WBS, this illustrates the resources required to complete each major task as well as produce each major output;
- **Risk Management Plan** – Identifies areas that may impact the success of the solution delivery, as well as mitigation strategies to reduce the probabilities of impacting the solution delivery. Risks can relate to scope, resources, timelines, budget, quality, or other aspects of the solution; *A sample Risk Mitigation Template is provided in Appendix A;*
- **Quality Management Plan -** Identifies the quality requirements agreed upon between the members of the IPT, Executive Sponsor and the ECAD Quality Assurance (QA) group. It also identifies the QA processes to be followed throughout the life cycle of the solution delivery**;**
- **Communications Plan -** Details the "who, what, when, and how" communication will be conducted between the IPT and the Executive Sponsor;
- **Configuration Management Plan** – Identifies the process and procedures for auditing and tracking all changes to a system during the specification, designing, coding, and testing phases; and
- **Assumptions and Constraints** – Documents all assumptions that exist regarding the delivery of the solution, such as responsibilities, facilities, etc., and also outlines any constraints that may impact the delivery of the solution.

This Project Work Plan should be baselined upon approval, and as it evolves be maintained by the IPT throughout the life cycle of the solution delivery. The Project Work Plan must be approved by the IPT Project Manager and the Executive Sponsor, acknowledged with a sign-off of the document.

Business Performance Model

The final task in the Vision Phase is to create a Business Performance Model, which will outline performance targets and indicators for the solution. This is a critical output because it provides the capabilities to measure the actual benefits achieved after the solution has been delivered.

The performance targets outlined in the Business Performance Model should relate directly to one or more of the overall SFA performance objectives:

- Reduce unit costs;
- Increase customer satisfaction; and
- Increase employee satisfaction.

A sample Business Performance Model is included for reference within Appendix A. It should contain the definitions of metrics as well as the methods of measurement, presentation, and communication that monitor the performance during implementation. For example, it may outline how many hours a day the system is required to be available, or how many transactions

are required to be processed within an hour. The Business Performance Model must be approved by the Executive Sponsor, acknowledged with a sign-off of the document.

Project Status Reports

One product that will be delivered repeatedly throughout all phases is the Project Status Report. Periodic (weekly/bi-weekly and/or monthly) status reports should be provided by the IPT to the Executive Sponsor and CIO ECAD that outline work accomplished, progress against planned budget and schedule, and major risks and issues that may affect successful development and delivery of the solution. *A sample Project Status Report is included for reference within Appendix A.*

2.4 Vision Phase Roles and Responsibilities

The following matrix provides a guide to the roles and responsibilities of the key personnel that participate in the Vision Phase of the life cycle.

Title	Role	Responsibility
IRB	Provide Funding.	Review Business Cases to determine if they meet the SFA's priorities and make the funding determination.
DSG	Business Case Analysis / Review.	Conduct "across the enterprise" analysis and review of all IT initiatives. Review Business Cases and submit to IRB for approval.
EXECUTIVE SPONSOR	Solution Sponsor.	Sponsor the submitted Business Case and approve the Business Performance Model and Project Work Plan. Approve Task Order awards.
EXECUTIVE STEERING COMMITTEE	Project Review and Recom-mendations.	Responsible for reviews and recommendations made throughout the delivery of the solution.

Title	Role	Responsibility
IPT	Solution Development and Delivery Team.	Definition of project goals and strategy. Development of Project Work Plan and Business Work Plan. Review Task Order proposal. Ensure the Security Phase checklist is completed and approved.
CIO ECAD	Liaison between the CIO and the Business Channels.	Review all documents, including the Business Case, Business Performance Model, Project Work Plan, SoO and Task Order proposal and make recommendations to the Business Channel for technical acceptance or rejection.
CIO IT SERVICES	Liaison between the Virtual Data Center (VDC) and the IPT.	Review solution Vision as defined in Business Case, Project Work Plan and the Business Performance Model. Provide recommendations for implementing the solution. Provide necessary planning data to the VDC.
CIO IT MANAGEMENT	Liaison between the Architecture Review Board (ARB) and the IPT. System Architect, Integration Architect.	Review the solution stated in the Business Case, Project Work Plan, and the Business Performance Model. Review and recommend any hardware, software, integration, and system architecture needs or procurements to the ARB.
ITR	Liaison between Contractor and Business Channels.	Review solution in Business Case, Project Work Plan, and Business Performance Model. Advise Executive Sponsor on solution vision issues.

Title	Role	Responsibility
SMEs – SFA, EXTERNAL, CONSULTANTS	Review and make recom-mendations.	Review the solution stated in the Business Case, Project Work Plan, and the Business Performance Model and make recommendations. Assist in the definition and development of the solution by providing solution-related expertise.
SYSTEMS SECURITY OFFICER	Review and make recommendations	Work with the Project Manager to ensure that the solution vision meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)
SYSTEMS MANAGER	Manage, review and make recommendations.	Works with the Project Manager and Systems Security Officer to ensure security meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)

2.5 Vision Phase Exit Criteria

The next phase of the life cycle is the Definition Phase, where more details of the project solution will become apparent. These details will include solution requirements and high-level design. Before the Vision Phase is considered complete, however, ensure that:

- The Business Case has been developed and approved by the IRB;
- The SoO has been issued;
- The Task Order has been awarded;
- An IPT has been formed;
- A Business Performance Model has been developed by the IPT and approved by the Executive Sponsor; and
- The Project Work Plan has been developed by the IPT and approved by the Executive Sponsor.

2.6 Vision Phase Job Aids

A checklist for use as a guide in developing the Project Work Plan is provided as a reference in Appendix B.

2.7 Vision Phase Security

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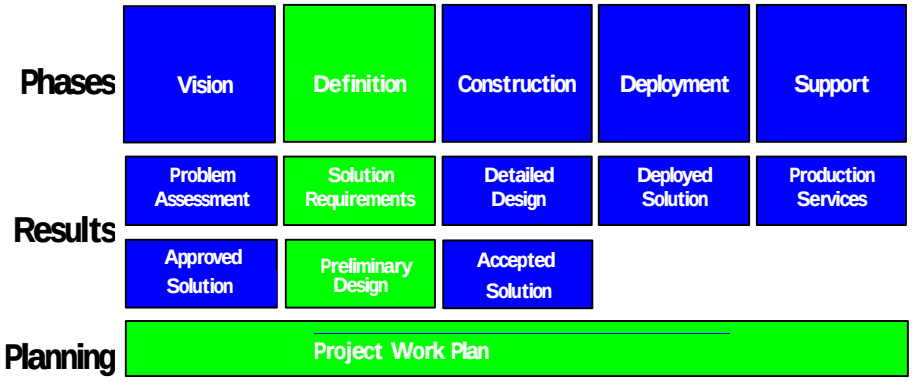
Note: The above list of activities is extracted from the overall system security project plan found in appendix X

3. DEFINITION PHASE



A summary of SDLC recommendations for use during the Definition Phase is contained within the following matrix.

Phase Area	SDLC Recommendations
OBJECTIVE	Establish and document the requirements and designs necessary to develop, test, and deploy the solution that will provide the benefits as outlined in the Business Case.
ENTRY CRITERIA	• The Business Case has been developed and approved by the IRB; • The SoO has been issued; • The Task Order has been awarded; • The IPT has been formed; • A Business Performance Model has been developed by the IPT and approved by the Executive Sponsor; and • The Project Work Plan has been developed by the IPT and approved by the Executive Sponsor.
PROCESS AND OUTPUTS *** Sample is provided in Appendix A**	• Updated Business Case; * • Updated Project Work Plan; * • Updated Business Performance Model; * • Requirements Document;* • Preliminary Design Document;* and • Project Status Reports.*

Phase Area	SDLC Recommendations
ROLES AND RESPONSIBILITIES	The following resources will participate in this phase: Executive Steering Committee Executive Sponsor IPT CIO ECAD CIO IT Services CIO IT Management ITR SMEs Systems Security Officer Systems Manager
EXIT CRITERIA	• Business Case, if updated, has been approved by the IRB; • Project Work Plan has been updated; - Quality Management Plan has been approved by ECAD QA Manager; • Business Performance Model, if updated, has been approved by the Executive Sponsor; • Requirements Document has been developed by IPT and approved by Executive Sponsor; • Preliminary Design Document has been developed by IPT and approved by Executive Sponsor; and • Task Order, if needed for Construction and Deployment, has been awarded. • SLC Security Definition Phase checklist completed and approved
JOB AIDS	SLC Security Definition Phase Checklist Additional Security Job Aids listed in the SFA Security Process Manual

3.1 Definition Phase Objective

The objective of this phase is to establish and document the requirements and preliminary design necessary to develop, test, and deploy the solution that will provide the benefits outlined in the Business Case.

In this phase, further groundwork for the development of the solution (i.e., requirements, design) will be laid. The Business Case was established in the Vision Phase of the life cycle. In the Definition Phase, the goal is to determine or define what is required to build the solution based on the Business Case. This will be accomplished by identifying and documenting the requirements

and preliminary design for which the solution will be implemented, tested, and accepted. The Requirements Document will become the basis upon which the team defines the products, architecture, and scope of the work to be performed in future phases. As requirements are completed, each requirement is traced back to the Business Performance Model and corresponding performance factors by which the organization will measure the solution's success. The Business Performance Model may need to be updated and resubmitted for approval. Throughout the Definition phase, work is being done to identify further details to update the Business Case and the Project Work Plan. For instance, the Quality Management Plan of the Project Work Plan will be completed and approved by the ECAD Quality Assurance manager.

The following topics and processes will be addressed in this phase of the life cycle:

- Entry Criteria;
- Process and Outputs;
- Roles and Responsibilities;
- Exit Criteria; and
- Job Aids.

3.2 Definition Phase Entry Criteria

Before work in the Definition Phase can begin, the exit criteria from the Vision Phase must be completed. To review, these are:

- The Business Case has been developed and approved by the IRB;
- The SoO has been issued;
- The Task Order has been awarded;
- An IPT has been formed;
- A Business Performance Model has been developed by the IPT and approved by the Executive Sponsor; and
- The Project Work Plan has been developed by the IPT and approved by the Executive Sponsor.

3.3 Definition Phase Process and Outputs

The following discusses the major processes and outputs to be completed during the Definition Phase.

Requirements Document

The first step in the Definition Phase is to gather requirements necessary for developing the proposed solution. A complete and thorough requirements gathering and analysis activity should be conducted to produce a Requirements Document. The results should lead to lower design and development costs and produce what amounts to a contract, in terms of what the IPT members agree to develop and what the Executive Sponsor agrees to accept. Requirements serve as the basis for:

- Developing a design;
- Making implementation decisions;
- Planning and executing tests; and
- Accepting the delivered system or solution.

There are many different methods for gathering requirements and it is likely that multiple techniques will be used during any project in order to get the complete picture or understanding of the solution. The following matrix provides a sample of the more commonly used requirements gathering methods, along with a brief description of the activities associated with that method.

Technique	Activity Description	Examples
EXISTING DOCUMENTATION REVIEW	Review documents that may be relevant to the project at hand, using more than one source if possible.	Modernization Blueprint, Architectural Standards, and Business Plans.
WORK PATTERN OBSERVATION	Observe currently established work practices and trends.	Day to day work processes and SMEs.
INTERVIEW SESSIONS	Interview managers and staff to determine their requirements.	Meet with Channel GMs / staff or Business Partners.
JOINT APPLICATION DEVELOPMENT (JAD)	Formal technique that brings functional and technical people together to develop requirements and plan the design. Intense workshop sessions are conducted in which end users and developers collaborate to produce the desired materials.	Special initiative is requested and requirements must be gathered in 3 weeks or less.
ANALYZE HELP DESK TROUBLE CALLS	Generate metrics based on Help Desk trouble calls in order to identify trends and opportunities for improvement.	Graph indicating type and number of calls per month.
PROTOTYPING	A demonstrable representation that assists in clarifying requirements.	• Screen Mock-up; • User Interface Prototype; • System Concept Prototype.

A sample Requirements Document is included for reference in Appendix A. The Requirements Document should include documentation of the requirement types identified in the following matrix.

Category	Description	Sample Requirement Types
BUSINESS	Document the reason for the project initiative. These should tie to the Modernization Blueprint.	• Achieving a competitive advantage; • Meeting regulatory needs; • Reducing cost.
SYSTEM	Describe the features or qualities the system must posses to accommodate the business and functional requirements. Identify the components of the system infrastructure and their associated performance and quality dimensions.	• Architecture; • Communications; • Security; • Performance capacity; • Date storage and retrieval; • Reliability and maintainability.
FUNCTIONAL	Describe day-to-day business activities within which the solution must operate and perform, in order to accomplish its mission, including people and processes.	• Describe system workflow; • Incorporate business rules; • Address quality definitions; • Identify reporting needs.
TECHNOLOGY	Constraints on the IPT development team related to the use of specific technologies. Must adhere to the SFA Technology Architecture Policies and Standards.	• Accommodate the current technology infrastructure; • Implement using a cost-effective technology;
DEPLOYMENT	Requirements that surface later during the life cycle and impact the delivered solution. Ensure that the deployment requirements trace back to a valid business requirement.	• Maintenance support; • Data conversion; • Deployment; • Training.
DESIGN	Specifies how a particular requirement will be met, rather than just what action a solution or system must perform.	• Design features; • Development environment; • Operating system.

In developing and documenting the requirements, SFA advocates the use of a standard tool to assist in the tracking of requirements and verification (during the testing activities in the Construction Phase) that the solution meets the requirements. This will aid in resolving Software Investigation Requests (SIR), as original requirements can be quickly tracked. For more information on this standard tool, refer to the Software Engineering Handbook.

Also, within the Requirements Document, a requirements traceability matrix is recommended to provide the relationships between requirements, documents, design, and implementation of a solution. Requirement traceability facilitates the ability to describe and follow the life of a requirement in both forward and backward directions.

Figure 3-1 illustrates how critical it is to be able to trace requirements through the SDLC. A development effort begins on the left-hand side of the V-model with analysis and design activities. The Business Case drives the overall requirements, which then drive the design and development activities. Once construction is complete, the product moves through the verification, validation, and testing activities on the right hand side of the V. During the earlier stages of testing, the focus is on individual components. As testing progresses, the focus is on functionality and the achievement of the Business Case. But all throughout, each task (indicated by a 'T' on Figure 3-1) or task package (indicated by a 'TP') ensures that the overall Business Case objectives and subsequent requirements are achieved. A requirements traceability matrix can effectively be used to map the requirements to Business Case objectives (on the front end) and to the preliminary design (on the back end).

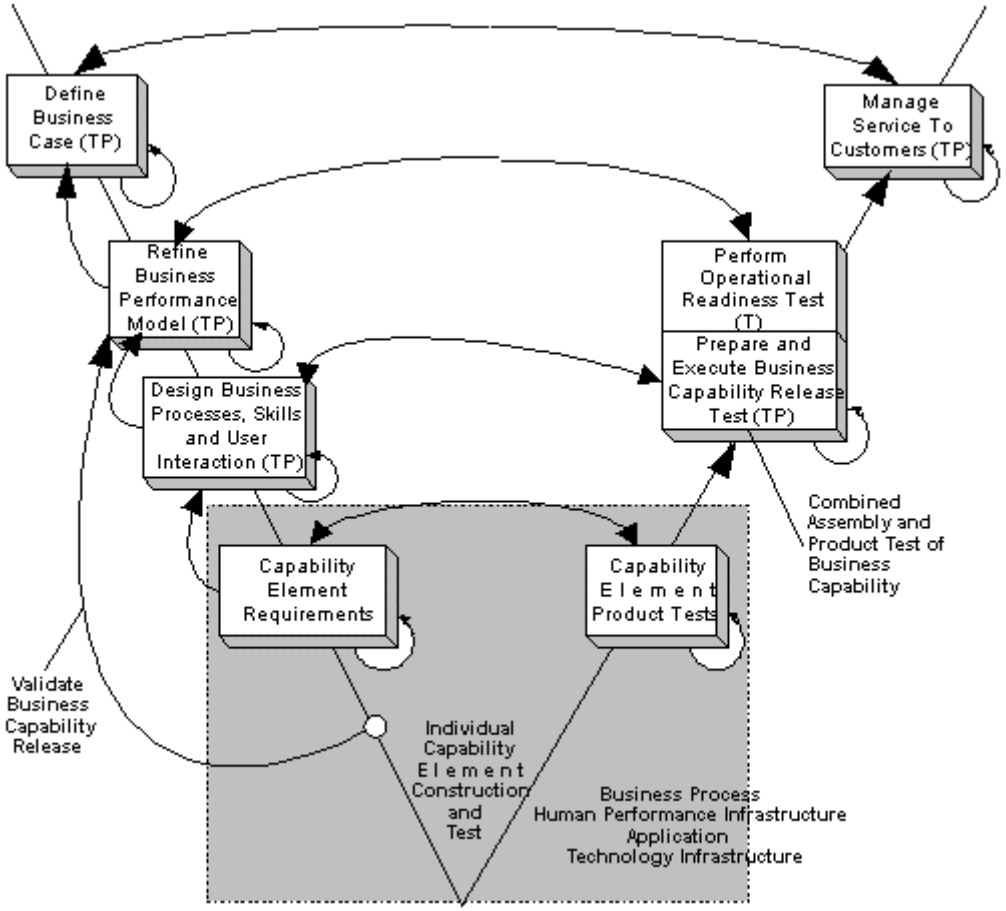


Figure 3-1 Requirements Traceability Diagram

One technique to facilitate review of requirements is a Solution Requirements Review (SRR). This is an interim review and/or committal point that provides an opportunity for the Executive Sponsor and IPT to agree upon and approve the solution requirements. During the review, all requirements documented in the Requirements Document are reviewed by both the Executive Sponsor and IPT, to ensure that everyone agrees on what the solution must accomplish. Sign-off must be obtained from the Executive Sponsor before moving into design mode, so the requirements can be baselined. After that, any new or modified requirements will require modification of the Requirements Document and approval by the Executive Sponsor prior to solution design modification.

Preliminary Design Document

Once the requirements have been agreed to by the Executive Sponsor and the IPT, the next step is to create the Preliminary Design, which will provide an abstract model of the solution. The Preliminary Design of the solution is often depicted visually through the use of graphic models, process flows, and block diagrams.

A sample Preliminary Design Document is included for reference in Appendix A. The Preliminary Design Document should include:

- **System Architecture Diagrams** - modular and layered graphical representation of the solution, accompanied by a written description that provides a more detailed explanation of the components, including descriptions of their respective functions and how they interrelate;
- **User Interface and Workflow -** screen diagrams and menus as well as storyboards that describe the look and feel of the recommended solution. The storyboards should indicate how information will flow through the system and how users will access that information;
- **Logical Data Models -** diagram of the data that is to be processed and stored by the system. This diagram and associated data dictionary describe the entities (data components), their attributes or fields, indexes, and foreign keys;
- **Report Content Descriptions -** includes a discussion of what tools, if any will be used to generate ad hoc and "canned" reports. Also describes:
  - Number and types of reports;
  - Frequency of report generation;
  - Sources for the information to be reported;
- **External System Interfaces -** describes how the recommended solution would interface with external systems. This should include for each external system:
  - *Frequency* that data will be exchanged;
  - *Manner* of the exchange (real-time, batch on-demand, or scheduled);
  - *Description* of the data to be exchanged; and
  - *Assignment* of the system of record (which systems will have the authority to create, update, or delete data elements);
- **Data Conversion and Migration Strategies -** describes how legacy data will be converted and migrated into the new system. Any data conversion and migration strategy must comply with the standards set forth in the Logical Data Model. The following information should be included for each legacy data set:
  - Location;
  - Data elements;
  - Volume of data to be converted;
  - Method to be utilized for the conversion (manual or automated data input, data transformation routine, or data load routine); and
  - Timing of the migration;
- **Interface Control -** defines one or more interfaces between two systems;
- **System Test Plans -** outlines the various kinds of testing that will be performed during the Construction Phase. It includes:
  - Overall testing approach;
  - Strategy for planning and executing each type of test;
  - Justification for not including a particular type of test; and
  - Test automation strategy, if applicable.

Refer to the System Integration and Testing Process Handbook for guidance for creating the System Test Plan.

- **System Test Description -** detailed plans needed for testing the solution. A detailed plan is required for each type of test outlined in the testing strategy. Test plans will not be fully developed until the detailed design is completed during the Construction Phase, but for now should include:
  - Test scenario description;
  - Inputs and outputs;
  - Expected results;
  - Frequency of tests; and
  - Test automation plan, if applicable.

  Refer to the System Integration and Testing Process Handbook for guidance for creating the System Test Description.

One technique to facilitate review of a preliminary design is to hold a Preliminary Design Review (PDR). This formal review should cover the entire Preliminary Design Document from beginning to end. This comprehensive walkthrough gives the Executive Sponsor the opportunity to develop a common understanding of the requirements and to resolve any outstanding issues. The PDR gives the IPT team one last forum to ensure understanding of requirements, acceptance criteria, and assumptions. The PDR provides a high-level picture of the solution and allows IPT members and the Executive Sponsor to make major implementation decisions simply and cost-effectively. It also gives the team an opportunity to make an early reality check and to verify that the solution is consistent with the requirements.

The PDR is also the appropriate time for the discussion on how the solution will be developed and deployed (i.e., custom development, use of COTS software or ASP vendors, etc.). The completion of the Definition Phase is a decision point for the IPT and the Executive Sponsor with regards to the most effective means of providing the solution. Approval of the Preliminary Design Document, as well as this development and implementation decision, must be obtained from the Executive Sponsor, acknowledged by sign-off, before exiting this phase.

If additional funding or contractor support is needed to construct and deploy the solution, then the Business Case will need to be updated by the IPT and approved by the IRB and a new Statement of Objectives may need to be created in order to award a new Task Order for the Construction and Deployment Phases.

3.4 Definition Phase Roles and Responsibilities

The following matrix is provided as a guide to the roles and responsibilities of the key personnel that are in the Definition Phase of the life cycle.

Title	Role	Responsibility
EXECUTIVE STEERING COMMITTEE	Project Review and Recommendations.	Responsible for reviews and recommendations made throughout the delivery of the solution.
EXECUTIVE SPONSOR	Solution Sponsor.	Review and approve Requirements Document and Preliminary Design Document. Also, review and approve any changes made to the Business Performance Model, Project Work Plan, Business Case and new Task Order award.
IPT	Solution Development and Delivery Team.	Requirements Documentation and Preliminary Design. Ensure the Security Phase checklist is completed and approved.
CIO ECAD	Liaison between the CIO and the Business Channels.	Participate in the development of and review the Requirements Document and Preliminary Design to ensure they meet the objectives defined in the Business Case and Business Performance Model. Also review Task Order proposal and make recommendations to the Business Channel for acceptance. Ensure compliance to the SDLC Process and SFA QA standards.
CIO IT SERVICES	Liaison between the VDC and the IPT.	Review the Requirements and Preliminary Design documents and work with IPT to identify needed VDC services. Notify the VDC of any planning changes identified during this phase.
CIO IT MANAGEMENT	Liaison between the ARB and the IPT. System Architect, Integration Architect.	Review the content within the Requirements and Preliminary Design Documents to ensure they meet the Technical Architecture standards. Review and recommend any hardware, software, integration, and system architecture needs or procurements to the ARB.

Title	Role	Responsibility
ITR	Liaison between contractors and Business Channels.	Review the Requirements and Preliminary Design Documents to ensure they meet the objectives as stated in the Business Case and the Business Performance Model.
SMEs – SFA, EXTERNAL, CONSULTANTS	Provide input to the Requirements and Preliminary Design.	Assist in the definition and development of the Requirements and Preliminary Design Documents by providing solution-related expertise.
SYSTEMS SECURITY OFFICER	Review and make security recommendations.	Work with the IPT Project Manager and others to ensure that the solution Preliminary Design meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)
SYSTEMS MANAGER	Manage, review and make recommendations.	Works with the Project Manager and Systems Security Officer to ensure security meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)

3.5 Definition Phase Exit Criteria

The next phase, Construction, is where the solution is developed and tested. Prior to that phase beginning, the following exit criteria for this phase must be met:

- Business Case, if updated, has been approved by the IRB;
- Project Work Plan has been updated;
  - Quality Management Plan has been approved by the ECAD QA Manager;
- Business Performance Model, if updated, has been approved by the Executive Sponsor;
- Requirements Document has been developed by the IPT and approved by Executive Sponsor;
- Preliminary Design Document has been developed by the IPT and approved by the Executive Sponsor; and
- Task Order, if needed for Construction and Deployment, has been awarded.

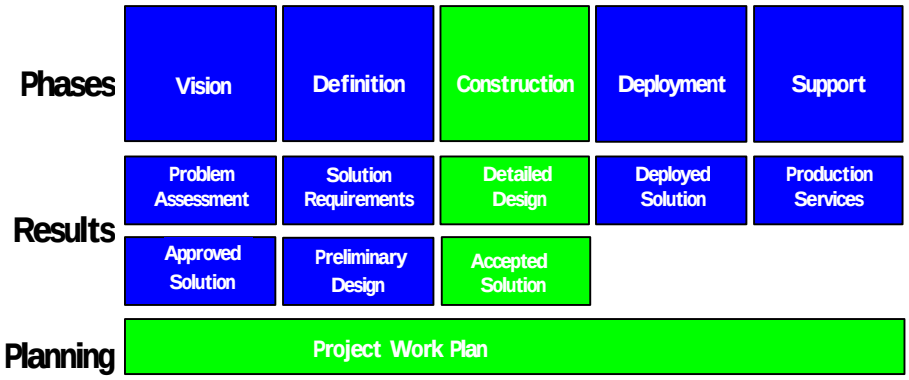
3.6 Definition Phase Job Aids

No job aids currently exist for Definition Phase.

3.7 Definition Phase Security

As the system progresses through the definition phase, several security actions should occur. The system should be defined as a new system or major modification to an existing system. The system's sensitivity should be classified and the system's criticality should be defined. To define sensitivity, the system owner (and its data) should review the importance of confidentiality, integrity, and availability. These factors dictate the security controls necessary to protect the assets of the system. Similarly, a security review should occur which will identify threats to the system as well as intrinsic vulnerabilities. Finally, the system's controls should be reviewed for federal and departmental policy compliance. At a minimum, the system should be reviewed for compliance with OMB Memorandum A-130 Appendix III, the Privacy Act, GISRA (NIST Self-Assessment), Department of Education Policy, and SFA policy. A security guidance compliance matrix should be constructed to document the findings of the review.

4. CONSTRUCTION PHASE



A summary of SDLC recommendations to use during the Construction Phase is contained within the following matrix.

Phase Area	SDLC Recommendations
OBJECTIVE	The objective of this phase is to develop and test an appropriate solution that meets the requirements defined in the Definition Phase, as well as the approved Business Case.
ENTRY CRITERIA	• Business Case, if updated, has been approved by the IRB; • Business Performance Model, if updated, has been approved by the Executive Sponsor; • Project Work Plan has been updated; - Quality Management Plan has been approved by ECAD QA Manager; • Requirements Document has been developed by the IPT and approved by the Executive Sponsor; • Preliminary Design Document has been developed by the IPT and approved by the Executive Sponsor; and • Task Order, if needed by Construction and Deployment, has been awarded.

PROCESS AND OUTPUTS *** Sample is provided in Appendix A**	• Detailed Design Document *; • Developed, Tested and Accepted Solution including source, object, and execution code; • System Test Plans * ; • System Test Results*; • Production Readiness Review (PRR) has been conducted; and • Project Status Reports.*
ROLES AND RESPONSIBILITIES	The following resources will participate in this phase: ESC Executive Sponsor IPT CIO ECAD CIO IT Services CIO IT Management ITR SMEs Systems Security Officer Systems Manager
EXIT CRITERIA	• A Detailed Design Document has been developed and approved by the Executive Sponsor; • A developed and tested solution, including source, object, and execution code, has been accepted by the Executive Sponsor; • PRR has been conducted and sign-offs obtained • SLC Security Construction Phase checklist completed and approved
JOB AIDS **(Included in Appendix TBD)**	PRR Checklist SLC Security Construction Phase Checklist Additional Security Job Aids listed in the SFA Security Process Manual
	•

4.1 Construction Phase Objective

The objective of this phase is to develop and test an appropriate solution that meets the requirements and acceptance criteria defined in the Definition Phase, as well as the approved Business Case.

The activities undertaken during the Construction Phase vary from project to project more so than in any other phase. The approach, tools, techniques, and deliverables will be determined in earlier strategy and tactical approach discussions and will be tailored to meet each specific solution. For example, the decision to develop and implement a custom solution, versus a COTS-based solution, or one involving an ASP, should be made before this phase begins. The processes

and outputs documented in the Construction section and Deployment section of this Guide apply to IPTs that have made the decision to implement the solution via custom development or using COTS software. Implementing with an ASP will enable the IPT to skip the processes and outputs associated with the Construction and Deployment Phases of the SDLC.

The construction phase contains numerous security activities. A large portion of these activities is dedicated to documentation. Primarily, the system security plan should be drafted during this phase. To accomplish this task, the project team members should first organize the following security-related documentation as described in the SFA System Security Process Guide.

The Construction Phase is where the high-level design is further refined into a detailed design. This phase is where the team builds a solution that meets the approved requirements. The Construction Phase consists of detailed design, construction and testing efforts, with the intent that the output of these efforts will meet the objectives as outlined in the Business Case. It is in this phase that the technical solution derived in the Definition Phase is implemented.

The following topics and processes will be addressed in this phase of the life cycle:

- Entry Criteria;
- Process and Outputs;
- Roles and Responsibilities;
- Exit Criteria; and
- Job Aids.

4.2 Construction Phase Entry Criteria

Before work in the Construction Phase can begin, the exit criteria from the Definition Phase must be completed. To review, these are:

- Business Case, if updated, has been approved by the IRB;
- Project Work Plan has been updated;
  - Quality Management Plan has been approved by the ECAD QA Manager;
- Business Performance Model, if updated, has been approved by the Executive Sponsor;
- Requirements Document has been developed by the IPT and approved by the Executive Sponsor;
- Preliminary Design Document has been developed by the IPT and approved by the Executive Sponsor; and
- Task Order, if needed for Construction and Deployment, has been awarded.

4.3 Construction Phase Process and Outputs

The following paragraphs discuss the major processes to be completed during the Construction Phase, as well as the outputs of this phase.

Detailed Design Document

The Detailed Design Document should provide enough information in order for the solution to be thoroughly developed. The ARB will be involved in the review process; therefore, the designs must also be able to convey conformity to the SFA Technical Architecture standards. *A sample Detailed Design Document is included for reference in Appendix A.* The Detailed Design Document should build upon the Preliminary Design Document and encompass the following:

- **Program/Screen/Reports Design** - describes the exact detailed configuration of the computer program. It consists of descriptions of the processing logic, data structures, data definitions, screen or report layouts (where applicable) and is sufficiently detailed so that it can be implemented into a solution;
- **Interface Design** - provides the specific details of the user interface, including dialogs or conversations, window screens or pages, forms, reports, and possibly user interface hardware (monitors, input devices);
- **Development Architecture Design** – builds on the system architecture diagrams from the Preliminary Design Document, providing the detail needed to construct the solution development architecture, such as hardware, software, access methods, and protocols used. The design specification further outlines actual sites, minimum configuration requirements, and site requirements (size, power, temperature, etc.);
- **Execution Architecture Design** – builds on the system architecture diagrams from the Preliminary Design Document, providing the detail needed to construct the solution execution (run-time) architecture, such as hardware, software, access methods, and protocols used. The design specification further outlines actual sites, minimum configuration requirements, and site requirements (size, power, temperature, etc.);
- **Operations Architecture Design** - builds on the system architecture diagrams from the Preliminary Design Document, providing the detail needed to support operation of the solution in an efficient manner;
- **Physical Infrastructure Design** - builds on the system architecture diagrams from the Preliminary Design Document, providing detailed diagrams, interface standards, protocols, and so forth to support the physical network and computing components. The detailed design should provide adequate information on how to configure and install the physical network and computing components;
- **Human Performance Design** – design the programs needed to evaluate, compensate, develop, and recruit personnel for the solution;
- **Physical Data Model Design** - provides the information and code needed to create or generate the solution database. It builds on the Logical Data Models defined in the Preliminary Design Document; and
- **Security Design** – provides detailed information on security requirements relating to facility, physical access, system access, administrative privileges, sensitive and mission-critical operations, site-specific practices, and other matters.

One technique to facilitate effective review of the Detailed Design Document is through a Critical Design Review (CDR). This formal review should cover the entire Detailed Design Document from beginning to end. This comprehensive walkthrough gives the IPT and the Executive Sponsor the opportunity to develop a common understanding of the detailed solution design and

to resolve any outstanding issues. Sign-off must be obtained from the Executive Sponsor before exiting this phase.

Developed, Tested and Accepted Solution including source, object, and execution code

This is the product that results from the transformation of design into the solution outlined in the Business Case. During this transformation from design, the application will be developed, tested and accepted by SFA prior to implementation, or deployment into production. For applications requiring custom development, this will entail writing code, while for applications utilizing a COTS product; modifications to the COTS product may be required. Appendix C contains information relating to Internet development standards, but for more discussion on SFA software development practices and standards, refer to the Software Engineering Handbook.

System Test Plans and Test Results

Once the solution has been developed, it is the responsibility of the IPT to test the application to ensure that the solution satisfies the defined functional, technical, and quality requirements. Refer to the SFA System Integration and Testing Process Handbook for the testing standards, procedures, templates and management guidelines used during testing. The first step in the testing process is the development of the test plans that were identified in the Testing Strategy of the Preliminary Design Document. Test plans should document all activities required to conduct thorough and accurate tests of system parameters, customizations, interface modules, and business processes.

The IPT is responsible for planning, preparing/developing, and executing each test plan. At this step, the test conditions, cycles, and scenarios should be identified, and individual responsibilities specified relating to the development and execution of the tests. Planning the tests also includes locating and inspecting all the documents, information, and infrastructure (e.g. hardware and software testing tools) necessary to design, develop, and execute the test plan. The test planning for each level is described as follows:

- ***Unit Test Plan*** – This document defines common testing conditions, outlines the approach for executing the unit test, and describes the process and tasks to the developer;
- ***Integration Test Plan*** – This document defines the approach for executing the integration test, details the integration test objective, assumptions, and potential risk. The plan should also detail the necessary resources and test requirements;
- ***Systems Test Plan*** – This document defines the approach for executing the systems test, and details the objective, assumptions, and potential risk. Also included in the test plan are the test requirements and the test resources;
- ***Performance Test Plan*** – This document defines the approach for executing the performance test, and details the objective, assumptions, and potential risk. Also included in the test plan are the test requirements and the test resources. The test plan will detail how to simulate large transaction volume and critical response time areas to be tested; and

- ***User Acceptance Test Plan*** – This document defines the approach for executing user acceptance test, and details the objective, assumptions, and potential risk. Also included in the test plan are the test requirements and the test resources. *Appendix A contains a sample User Acceptance Test Plan.*

During test planning, it is important to identify all possible scenarios that could affect the way the application will behave. These scenarios can be as detailed as applicable, depending on the time and abilities of the application/system being tested. Test scripts provide a description of inputs, execution instructions, and expected results created to determine if a specific application software feature functions correctly or if a specific requirement was satisfied. Unit, system, and integration test scripts rely on the design of the code in addition to the requirements and are initially developed during detailed design as part of the test strategy. Test scripts are continuously updated, as design and code are refined during the Construction Phase. The test script process for each level of testing is described below:

- ***Unit Test Scripts*** – Unit test scripts are based on knowledge of how the logical unit is designed to work and can be written once the detailed design specifications are completed. Each script includes tests for field ranges, values and lengths, each function, data validation, data dependencies, and special processing contained in the module. The unit test scripts should be updated as changes occur to the requirements and/or the detailed design specifications either before coding starts or while it is in process. The developer responsible for the module will run the unit test for that module. At the end of the unit test, all errors related to the independent operation of the program should be found;
- ***Integration Test Scripts*** – While the unit test scripts focus on the smallest logical unit or module of code, the integration test scripts focus on how multiple components work together and communicate. The integration test scripts describe test cases for the interfaces and interactions between system components as they are put together to form progressively larger subsystems. Integration test scripts also test the screens together as a cohesive information function, and then are built upon to test how the information function integrates with other functions in the system. By the end of integration test, all functions will be integrated into the system and all internal interfaces will be tested;
- ***System Test Scripts*** – The system test scripts expand on the high-level test scenarios and scripts developed during high-level design. The testers can reuse relevant test scenarios and conditions from the unit and integration test scripts;
- ***Performance Test Scripts*** – The performance test scripts expand on the high-level test scenarios and scripts developed during high-level design. These scripts detail the steps necessary to fully ensure that the deployed solution will be able to handle the expected workload and adequately address the business objectives stated in the Business Case and Business Performance Targets stated in the Business Performance Model; and
- ***User Acceptance Test Scripts*** – User acceptance test scripts expand on the high-level test scenarios and scripts developed during high-level design. User acceptance test

scripts test the requirements from a user perspective. They include enough test conditions to determine if the application meets the user acceptance criteria.

In developing and documenting the testing approach, SFA advocates the use of a standard tool to assist in the tracking of requirements (during the Definition Phase) and verification that the solution meets the requirements. This will aid in resolving Software Investigation Requests (SIR), as original requirements can be quickly tracked. For more information on this standard tool, refer to the Software Engineering Handbook.

Once these tests have been successfully executed by the IPT, the Test Results should be documented that clearly indicate the testing procedures, data used during the testing processes and results demonstrating that the application meets the business objectives as stated in the Business Case and meets the performance targets as stated in the Business Performance Model.

Production Readiness Review (PRR)

The purpose of the PRR is to establish a common process that defines the activities and the roles of all IT groups supporting the decision to implement a production application. *A checklist is available in Appendix B to aid in the preparation for the PRR.*

The objectives of the PRR are as follows:

- Review performance compared to anticipated value and success measures;
- Review converted data; and
- Assess the readiness of technology infrastructure.

Once the PRR has been completed, the solution is ready to be deployed and turned over to the VDC for support. For more information on the activities associated with the PRR, refer to the PRR Procedures Guide in the Software Engineering Handbook.

4.4 Construction Phase Roles and Responsibilities

The following matrix is provided as a guide to the roles and responsibilities of the key personnel that are in the Construction Phase of the life cycle.

Title	Role	Responsibility
EXECUTIVE SPONSOR	Solution Sponsor.	Review and approve Detail Design Document and sign-off on the completion of the PRR.

Title	Role	Responsibility
EXECUTIVE STEERING COMMITTEE	Overall Review and Recommendations.	Responsible for reviews and recommendations made throughout the solution.
IPT	Project Development and Delivery Team.	Development, testing, and implementation of the approved solution. Complete and obtain approvals for the PRR. Ensure the Security Phase checklist is completed and approved.
CIO ECAD	Liaison between the CIO and the Business Channels.	Review the Detailed Design documents to ensure they meet the operational objectives as stated in the Business Case and the Business Performance Model. Ensure compliance to the SDLC and SFA's QA standards. Provide feedback to the CIO and channel for acceptance for the PRR.
CIO IT SERVICES	Liaison between the VDC and the IPT.	Review the Detailed Design documents and work with the IPT to identify needed VDC services. Provide feedback to the CIO for acceptance for the PRR. Provide relevant data to the VDC for preparation into production.
CIO IT MANAGEMENT	Liaison between the ARB and the IPT. System Architect, Integration Architect.	Review the content within the Detailed Design Documents to ensure they meet the objectives of the Technical Architecture standards and recommend any hardware, software, integration, and system architecture needs or procurements to the ARB. Provide feedback to the CIO for acceptance for the PRR.

Title	Role	Responsibility
ITR	Liaison between contractors and Business Channels.	Review the Detailed Design Documents to ensure they meet the objectives as stated in the Business Case and the Business Performance Model.
SMES – SFA, EXTERNAL, CONSULTANTS	Assist in Developing, Testing, and Documenting the Solution.	Assist in the development, testing, and documentation of the solution by providing solution-related expertise.
SYSTEMS SECURITY OFFICER	Review and make security recommendations	Work with the IPT Project Manager and others to ensure that the solution and Detailed Design meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)
SYSTEMS MANAGER	Manage, review and make recommendations.	Works with the Project Manager and Systems Security Officer to ensure security meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)

4.5 Construction Phase Exit Criteria

In the Construction Phase, the development of the detailed design from the high-level design developed in the Definition Phase was discussed, as well as how this detailed design should build on the Preliminary Design and trace back to the Requirements Document and the Business Case. The construction and testing of the solution was also discussed. The PRR process was mentioned as a last step in the Construction Phase to be completed prior to the implementation of the solution.

Prior to the completion of the Construction Phase, the following exit criteria must be met:

- A Detailed Design Document has been developed by the IPT and approved by the Executive Sponsor;

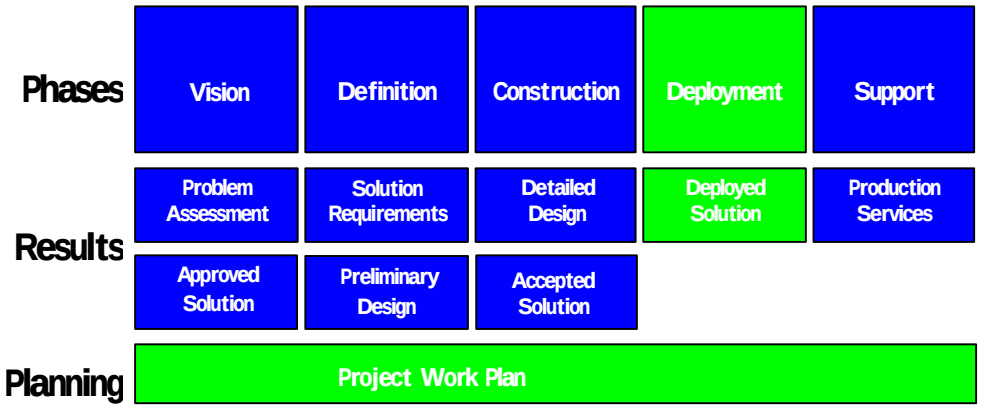
- A developed and tested solution, including source, object, and execution code, has been accepted by CIO; and
- PRR has been conducted and signoff obtained.

4.6 Construction Phase Job Aids

For reference, the PRR Checklist is included in Appendix B.

- ~~Draft System Security Plan~~
- ~~Draft Continuity of Operation Plan~~
- ~~Draft Disaster Recovery Plan~~
- ~~Draft System Security Authorization Agreement~~
- ~~Threat Analysis~~
- ~~Impact Analysis~~
- ~~Risk Assessment Corrective Action Plan~~
- ~~Final MOU/SLA~~
- ~~Completed User Background Investigation Clearance Form~~
- ~~Approved User Access Request Form~~
- ~~System Access Letters to Contractor Employees~~

5. DEPLOYMENT PHASE



A summary of SDLC recommendations to use during the Deployment Phase is contained within the following matrix.

Phase	SDLC Recommendations
OBJECTIVE	Deploy the developed solution into production for utilization by the user community.
ENTRY CRITERIA	• A Detailed Design Document has been developed by the IPT and approved by the Executive Sponsor; • A developed and tested solution, including source, object, and execution code, has been accepted by CIO; and • PRR has been conducted and signoff obtained.
PROCESS AND PRODUCTS *** Sample is provided in Appendix A**	• Deploy Solution; • Conduct User Training; • Service Level Agreements; and • Project Status Reports.*

ROLES AND RESPONSIBILITIES	The following resources will participate in this phase: Executive Sponsor Executive Steering Committee IPT CIO IT Services Systems Security Officer
EXIT CRITERIA	• Solution has been successfully deployed; • Applicable training has been conducted; and • Arrangements have been made with the organization(s) responsible for operating and maintaining the solution (SLAs have been established). • SLC Security Deployment Phase checklist completed and approved
JOB AIDS	SLC Security Deployment Phase Checklist Additional Security Job Aids listed in the SFA Security Process Manual
	•

5.1 Deployment Phase Objective

The objective of the Deployment Phase is to place the system in production and enable the organizational adoption of a solution. The Deployment Phase transitions a solution from SFA development and acceptance to production. At the conclusion of the Deployment Phase, the new system is considered in "Production" and the Support Phase commences.

In the Deployment phase, several security related activities introduced in prior phases should be brought to closure. (See SFA Systems Security Process Guide for specifics. Appendix TBD) The corrective action plan developed in the construction phase risk assessment should be implemented. Once implemented, each CAP element should be dated and initialed indicating completion of the element. The CAP should then be submitted to the SSO for maintenance.

The construction phase reviewed the security controls as they are documented. During deployment, the security controls should undergo a series of tests to determine if the controls were implemented properly and effectively. Initially, a security test plan should be developed.

As with the Construction Phase, the decision to develop and implement a custom solution, versus a COTS-based solution, or one involving an ASP, should be made before this phase begins. The processes and outputs documented in the Construction section and Deployment section of this Guide apply to IPTs that have made the decision to implement the solution via custom

development or using COTS software. Implementing with an ASP will enable the IPT to skip the processes and outputs associated with the Construction and Deployment Phases of the SDLC.

The following topics and processes will be addressed in this phase of the life cycle:

- Entry Criteria;
- Process and Outputs;
- Roles and Responsibilities;
- Exit Criteria; and
- Job Aids.

5.2 Deployment Phase Entry Criteria

Before work in the Deployment Phase can begin, the exit criteria from the Construction Phase must be completed. To review, these are:

- A Detailed Design Document has been developed by the IPT and approved by the Executive Sponsor;
- A developed and tested solution, including source, object, and execution code, has been accepted by CIO; and
- PRR has been conducted and signoff obtained.

5.3 Deployment Phase Process and Outputs

Once the PRR has been successfully completed at the end of the Construction Phase, the actual deployment activities will commence. For SFA applications, all deployment activities after the PRR has been completed are the responsibility of the organization responsible for operating the application. For the majority of SFA applications, this will be the VDC. Therefore, the deployment procedures required by the VDC should be followed. For SFA applications not deployed at the VDC, the procedures of the operations organization should be followed.

One of the primary activities involved in these deployment activities is the establishment of SLAs with the operational architecture hardware and software vendors, to ensure post-deployment support will be provided If additional funding or contractor support is needed to support the solution, then the Business Case will need to be updated by the IPT and approved by the IRB and a new Statement of Objectives will need to be created in order to award a new Task Order for the Support Phase. The processes and outputs for the Business Case, Statement of Objectives, and Task Order are addressed in the Vision Phase.

Once the system has been deployed, training may be required in order to allow the deployed solution to be fully utilized. This training may involve any number of audiences – end users, system administrators, operations and maintenance personnel, etc. The breadth and depth of training provided to each of these groups will vary by solution type, and therefore is not discussed in detail in this Guide.

5.4 Deployment Phase Roles and Responsibilities

The following matrix is provided as a guide to the roles and responsibilities of the key personnel that are in the Deployment Phase of the life cycle.

Title	Role	Responsibility
EXECUTIVE SPONSOR	Solution Sponsor.	Make final determinations for approval of completed solution.
EXECUTIVE STEERING COMMITTEE	Overall review and recommendations.	Responsible for reviews and recommendations made throughout the solution deployment.
IPT	Project Development and Delivery Team.	Enable knowledge transfer to the VDC Operations personnel. Ensure the Security Phase checklist is completed and approved.
CIO IT SERVICES	Liaison between the VDC and the IPT.	Works with the VDC on all deployment tasks.
SYSTEMS SECURITY OFFICER	Review and make security recommendations	Works with the IPT and the VDC to ensure that deployment of the completed solution meets the SFA's Security Standards. (See SFA Systems Security Process Guide for specifics. Appendix TBD)
SYSTEMS MANAGER	Manage, review and make recommendations.	Works with the Project Manager and Systems Security Officer to ensure security meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)

5.5 Deployment Phase Exit Criteria

In the Deployment Phase, the rollout of the solution to the user community was discussed. Prior to the completion of the Deployment Phase, the following exit criteria must be met:

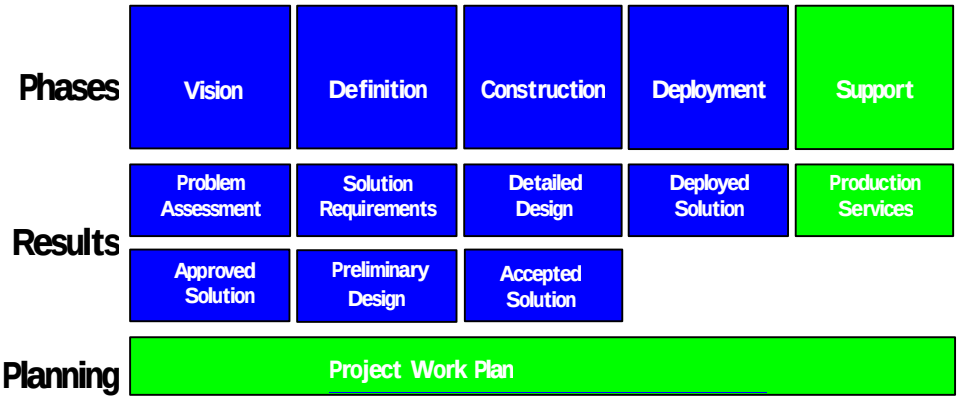
- The solution has been successfully deployed;
- Applicable training has been conducted; and
- Arrangements have been made with the organization(s) responsible for operating and maintaining the solution (SLAs have been established).

5.6 Deployment Phase Job Aids

No Job Aids currently exist for the Deployment Phase.

- Documented Completion of CAP from Construction Phase
- Security Test Plan
- Test Results
- Final SSAA
- Certification Letter
- Signed Accreditation Letter
- Final System Security Plan
- Final Continuity of Operation Plan
- Final Disaster Recovery Plan
- User Training Schedule
- Approved User Access Request Forms

6. SUPPORT PHASE



A summary of SDLC recommendations for use during the Support Phase is contained within the following matrix.

Phase Area	SDLC Recommendations
OBJECTIVE	Provide operational and maintenance support for the deployed solution.
ENTRY CRITERIA **(Sample provided in Appendix A)**	• The solution has been successfully deployed; • Applicable training has been conducted; and • Arrangements have been made with the organizations responsible for maintaining the solution (SLAs* have been established).
PROCESS AND OUTPUTS	• Provide operations and maintenance support to deployed solution; • Provide performance reports to CIO for deployed solution; and • Close IPT.
ROLES AND RESPONSIBILITIES	The following resources will participate in this phase: Executive Sponsor CIO IT Services Systems Security Officer

Phase Area	SDLC Recommendations
EXIT CRITERIA	Solution is retired SLC Security Construction Phase checklist completed and approved
JOB AIDS	SLC Security Construction Phase Checklist Additional Security Job Aids listed in the SFA Security Process Manual

6.1 Support Phase Objective

The objective of the Support Phase is to smoothly operate the new business capabilities that were created and deployed in the Deployment Phase of the SDLC Process. The work in this phase must also meet the formal service targets and metrics established earlier in the life cycle. In addition, it must provide mechanisms for providing feedback for improvements based on measurements of actual performance against those targets. Given these guidelines, the Support Phase applies to all information systems and related system engineering activities associated with a deployed solution. This may include hardware, COTS products, and/or custom software, and documentation. In particular, the focus of this phase is an enterprise view of maintenance and support.

The support phase continues throughout the life of the system. Once the system is deployed, several security activities and documents should be completed or updated. The System Security Plan should be reviewed and updated as the system undergoes major changes; that is, undergoes changes significant enough to alter the security posture of the system. OMB Circular A-130 Appendix III requires a review of security controls every three years or upon major system change. SFA recommends these reviews occur every year due to the rate of system change occurring at SFA. Also, the Government Information Security Reform Act requires a program and system review every year. The guidance to be used for this review can be found in the NIST Self Assessment Guide for Information Technology Systems. The self-assessment review will assist the SSO and system owner determine security control priorities based on weaknesses in policy, procedures, implementation, testing, and integration.

6.2 Support Phase Entry Criteria

Before work in the Support Phase can begin, the exit criteria from the Deployment Phase must be completed. To review, these are:

- The solution has been successfully deployed;
- Applicable training has been conducted; and

- Arrangements have been made with the organizations responsible for maintaining the solution (SLAs have been established).

6.3 Support Phase Process and Outputs

When the Support Phase begins, the solution has been defined, created, and deployed. Now steps need to be taken to ensure that the solution continues to be a beneficial, efficient, and utilized product. This phase of the life cycle focuses on the maintenance and support of the deployed solution. However, personnel within the VDC perform most of the activities within this phase outside of the IPT. Therefore, the topics covered in this section are only briefly touched on.

Operations and Maintenance

Before the solution can be deployed, the IPT needs to ensure that the necessary arrangements have been made to ensure a smooth transition to supporting the solution. The organization responsible for operating and maintaining the application (the VDC, for most SFA applications) needs to be extensively involved in preparing for the PRR, and needs to have the necessary SLAs in place to operate and maintain the solution. Please refer to the SFA Operations and Maintenance checklist for the procedures that need to be followed during this transition. Also, if a separate operations and maintenance task order needs to be created, the IPT Lead should work with the SFA Contracting Office to clearly define and scope the activities associated operating and maintaining the solution.

One of these activities that is the responsibility of the operating organization involves providing Help Desk services. A Help Desk is a group that is implemented to support a user community with all issues as they relate to specific applications or business functions. Help Desks can have several different constituents. Many may come from the SFA community, and others may include external customers, such as students and schools. It is at the discretion of the organization as to whether the help desk be dedicated to a single application or multiple applications. This often is dependent on the complexity of the application, number of users, and cost.

Another factor in deciding whether or not to set up a Help Desk is that they can serve as a way of gathering information from the user community on the types of issues faced in introducing the solution. Therefore, metrics from the Help Desk can be used to guide the SFA in developing systems that are better received as time goes on. A Help Desk can be used as a way of capturing information on the types of enhancements and modifications respective user communities are interested in receiving.

Performance Reports

The operating organization is also responsible for ensuring that the deployed solution continues to meet the performance objectives stated in the Business Performance Model. Regular reports should be provided to the CIO regarding these performance objectives, and the CIO is responsible for addressing related issues that arise.

IPT Closure

Once the solution has been deployed, the IPT transitions responsibility of the solution over to the sponsor and the operating organization. A lessons learned document may be created at this time that outlines overall issues that arose during the development and implementation of the solution, and this should be provided to other IPTs to facilitate knowledge sharing among SFA applications.

6.4 Support Phase Roles and Responsibilities

The following matrix is provided as a guide to the roles and responsibilities of the key personnel that are in the Support Phase of the life cycle.

Title	Role	Responsibility
EXECUTIVE SPONSOR	Solution Sponsor.	Review solution performance.
CIO IT SERVICES	Liaison between the VDC and the IPT.	Work with the VDC on all support tasks.
SYSTEMS SECURITY OFFICER	Review and make security recommendations	Work with the VDC to ensure that support of the deployed solution meets the SFA's Security Standards.
SYSTEMS MANAGER	Manage, review and make recommendations.	Works with the Project Manager and Systems Security Officer to ensure security meets the SFA's security requirements. (See SFA Systems Security Process Guide for specifics. Appendix TBD)

6.5 Support Phase Exit Criteria

The Support Phase will continue until the system is retired or until a new solution is envisioned and the life cycle begins again.

6.6 Support Phase Job Aids

No Job Aids currently exist for the Support Phase.

6.7 Support Phase Security